Australian Dental Journal
The official journal of the Australian Dental Association

AUSTRALIAN DENTAL ASSOCIATION INC.

Australian Dental Journal 2015; 60: 18–23

doi: 10.1111/adj.12264

Clinical features of gingival lesions in patients with dystrophic epidermolysis bullosa: a cross-sectional study

G Fortuna,*† M Aria,‡ R Cepeda-Valdes,† A Pollio,§ MG Moreno-Trevino,¶ JC Salas-Alanís† ¶

*Department of Oral Medicine, Carolinas Medical Center, Charlotte, North Carolina, USA.
†DebRA Mexico Foundation, Guadalupe, Nuevo León, Mexico.
‡Department of Economics and Statistics, Federico II University of Naples, Monte Sant'Angelo, Naples, Italy.
§Department of Neuroscience, University of Padua, Padua, Italy.
¶Department of Basic Science, Universidad de Monterrey, Nuevo León, México.

ABSTRACT

Background: Gingival lesions in patients with dystrophic epidermolysis bullosa (DEB) are a common manifestation. However, their clinical features, frequency and severity are currently unknown.
Methods: Forty-five DEB patients were assessed by an oral medicine specialist, who analysed the presence/absence of four clinical signs (erythema, erosion/ulcer, atrophy, blister) on free and attached gingiva, using the Epidermolysis Bullosa Oropharyngeal Severity score.
Results: Twenty-eight (62.2%) out of 45 DEB patients showed different types of gingival lesions, whose presence/absence and total frequency/distribution were not significantly different between males and females ($p = 0.087$ and $p = 0.091$, respectively). Erythema was the most prevalent lesion (66.2%) and the recessive DEB severe generalized (RDEB-sev gen) reached the highest median disease activity score. A significant correlation was observed between the DEB subtypes and the disease activity median score ($p < 0.001$), but not between age and total disease activity score in each group of DEB ($p > 0.05$). Lastly, logistic regression showed that only gender ($p = 0.031$) and RDEB-sev gen ($p = 0.001$) were risks factors for the presence of gingival lesions.
Conclusions: Gingival lesions in DEB patients are a relatively common entity and may have multiple clinical aspects, emphasizing the need for thorough attention and awareness among dentists.

Keywords: EB, epidermolysis bullosa, disease activity, oral hygiene, treatment.

Abbreviations and acronyms: DEB = dystrophic epidermolysis bullosa; EBOS score = Epidermolysis Bullosa Oropharyngeal Severity score; RDEB-sev gen = recessive DEB severe generalized.

(Accepted for publication 22 April 2014.)

INTRODUCTION

Epidermolysis bullosa (EB) is considered an inherited mucocutaneous disorder characterized by a fragility of the skin and mucous membranes following mild mechanical trauma, resulting into development of continuous blisters.[1] Four major types of EB have been recently described based on the level of skin cleavage: intraepidermal (EB simplex [EBS]); intralamina lucida (junctional EB [JEB]); sublamina densa (dystrophic EB [DEB]); and mixed (Kindler syndrome). For each of these, there exist several distinct subtypes.[2]

EB patients may display a wide variety of clinical manifestations, involving not only skin and mucous membranes, but internal organs as well. Oral-pharyngeal manifestations in EB vary markedly in both character and severity depending largely on the EB type.[3] Such features include repeated occurrence of blisters and erosions, accompanied by erythema, atrophy and ultimately scars, which lead to ankyloglossia, microstomia, and the disappearance of gingival fornices.[4]

In human patients with EB simplex, the oral-pharyngeal involvement appears to be limited but with a high variability; erosions occur in about 25% of EBS localized patients during infancy, and more common lesions within patients with generalized intermediate and generalized severe EBS. Conversely, the enamel seems to be normal with an occurrence of dental caries similar to unaffected populations.[2]

In the junctional type, EB patients usually show normal soft tissue mobility and architecture, except for the Herlitz EB subtype that is characterized by exuberant perioral granulation tissue. Subsequently, EB patients may experience microstomia and some

loss of tissue mobility in the lips and perioral tissues.[3] As some of the genes involved in the pathogenesis of the junctional EB subtypes (i.e. beta chain of laminin-332[5] and type 17 collagen[6]) also play a pivotal role in the formation of normal teeth, the enamel may present with different degrees of abnormalities, from generalized pitting to a generalized hypoplasia.[3]

Dystrophic epidermolysis bullosa (DEB) (OMIM #120120) is one of the four major types of EB, which can be inherited in a dominant (DDEB) or recessive (RDEB) fashion, exhibiting a wide variety of mucocutaneous manifestations, ranging from very mild to very debilitating and severe phenotypes.[1] In such patients, oral-pharyngeal manifestations may involve both the hard and soft tissues, displaying variability in clinical features and degree of severity.[7,8] Indeed, the milder forms including localized EB simplex are usually characterized by sporadic and small lesions that heal rapidly without scarring, whereas the more severe forms such as severe generalized RDEB, are characterized by oral-pharyngeal lesions that may affect the entire oral cavity and are variable in size, quality and quantity.[4,9] In some cases, such lesions may lead to a scarring phenotype (i.e. microstomia, ankyloglossia and loss of vestibule), with severe impairment of the patient's quality of life and oral health.[4,9]

Though the main oral-pharyngeal mucosal lesions of EB are represented by vesiculo-bullous lesions, other types of lesions such as erythema, erosion and atrophy, may involve one of more of the 13 oral-pharyngeal mucosal sites (upper and lower lip, right and left buccal mucosa, upper and lower gingiva, upper and lower vestibule, hard palate, soft palate, oropharynx, floor of the mouth and tongue) with a variable frequency and severity.[4]

To date, there is no information regarding the frequency and severity of gingival lesions in patients with DEB, most likely due to the rare occurrence of this disorder in the human population, rendering an assessment of gingival lesions an arduous task. The purpose of this clinical study was to analyse the clinical features of gingival lesions in DEB patients from Northern Mexico, assessing their prevalence, localization and disease activity.

METHODS

Study design and patient assessment

This was a cross-sectional clinical study involving 45 patients diagnosed with DEB between June 2012 and November 2012, ascertained from Universidad de Monterrey, Mexico and DebRA Mexico, Monterrey, Mexico. All patients provided written informed consent for the management of personal data before participating in the study. The study was approved by the ethical committee of the Universidad de Monterrey, Mexico and was conducted in adherence with the Declaration of Helsinki Principles Guidelines.

All DEB patients recruited for this study met the following inclusion criteria: (1) patients of both genders, all ages and races, with the presence of typical mucocutaneous lesions of DEB, as previously reported;[2] (2) diagnosis of DEB based on analysis of a skin biopsy including histology, immunofluorescence antigen mapping and, if available, electron microscopy and DNA analysis; and (3) patients able to give consent if older than 18 years. For younger patients, consent was obtained from their parents or a legal guardian. Patients were excluded from the study if they had used topical corticosteroids, topical or systemic antifungal therapy three weeks prior to the study as such medications might significantly affect their clinical appearance. Patients with present or past medical history of oral-pharyngeal malignancy and/or potentially malignant disorders on free and/or attached gingival mucosa, or who were pregnant or breastfeeding, were also excluded from this study.

DEB patients were divided into three groups based on the most recent International Consensus classification:[2] 13 with DDEB, 8 with RDEB-intermediate generalized (RDEB-int gen) and 24 with RDEB-severe generalized (RDEB-sev gen). The assessor consisted of one board-certified oral medicine specialist (GF) who had extensive experience diagnosing, treating and managing patients with EB. A complete clinical intra-oral examination was performed for all 45 patients. Free and attached gingiva of maxilla and mandible were analysed in order to detect the presence or absence of four clinical signs: erythema, erosion/ulcer, atrophy, blister, as defined elsewhere.[10] These signs represented the disease activity, which has been evaluated in all affected patients through the Epidermolysis Bullosa Oropharyngeal Severity (EBOS) score.[4] The disease activity score was evaluated on upper and/or lower gingiva affected by one or more clinical signs. We decided to assign one point to each clinical sign present on one or both jaws.

Statistical analysis

Descriptive statistics of demographic characteristics and EB type/subtype distribution was calculated as mean $\pm$ standard deviation. A McNemar's test was employed to compare the presence of any type of gingival lesions and a Fisher's exact test was used to detect any possible difference in the distribution of dentition between males and females. The chi-square test was used to compare the frequency of lesions between the two genders. Medians, interquartile ranges (IQR), and range of disease activity scores

were calculated for each DEB group. A non-parametric Kruskal–Wallis analysis of variance (K–W ANOVA) was used to assess the difference of disease activity median score among the three groups of DEB, whereas a Spearman's correlation coefficient was employed to assess the relationship between age and disease activity total score calculated in each DEB group. Lastly, backward logistic regression analysis was carried out using the presence of gingival lesions as a dependent variable, and age, gender and type of DEB as the independent variables.

P-values of less than 0.05 were considered significant. Statistical analyses were performed using the SPSS software (IBM SPSS for Windows, version 20.0; IBM, USA).

RESULTS

Patients' characteristics and frequency/distribution of gingival lesions

Forty-five patients with DEB were enrolled in the study; their ages ranged from 6 months to 63 years (mean: 18.9 years for males and 21.4 for females). Fourteen men (31.1%) and 31 women (68.9%) were evaluated to determine the presence/absence of erythema, erosion/ulcer, blister and atrophy on the upper and lower gingiva (Table 1).

Of the 45 DEB patients, 28 [11 males (24.4%) and 17 females (37.7%)] exhibited gingival involvement with a variable distribution among the three different DEB groups. Neither the presence/absence of the four types of gingival lesions ($p = 0.087$) nor the distribution of the dentition ($p = 0.0512$) were significantly different between males and females (Table 1).

Similarly, the frequency and distribution of gingival analysis demonstrated the presence of 74 lesions in 28 out of 45 (62.2%) DEB patients, where erythema was the most common gingival lesion (66.2%), followed by erosions/ulcers (31.1%), and atrophic lesions were completely absent (Fig. 1). All gingival lesions were equally distributed with no statistically significant difference between males and females either on the maxilla ($p = 0.246$) or mandible ($p = 0.223$) (Table 2).

Correlation of disease activity score with DEB types and age

A significant correlation was observed between the three DEB types and the median disease activity score calculated either on both jaws or separately (K–W ANOVA; $p < 0.001$) (Table 3), but not between age and the disease activity total score. For example, there was an increased score in all DEB groups that correlated with age (DDEB: $\rho = 0.372$, $p = 0.21$; RDEB–int gen: $\rho = 0.362$, $p = 0.22$; RDEB-sev gen: $\rho = 0.132$, $p = 0.53$), calculated on both jaws, but none were statistically significant (Table 4).

Table 1. Characteristics of patients with DEB

			No. of patients (%)
Total			45 (100)
Male			14 (31.1)
Female			31 (68.9)
Mean age (range)			**M:** 18.9 yrs (0.5–59) **F:** 21.4 yrs (1.5–63)
Dominant form			13 (28.9)
Recessive form			32 (71.1)
EB type/ subtype	Total number of males (%)	Total number of females (%)	Total number of DEB patients
DDEB	5 (11.1)	8 (17.8)	13 (28.9)
RDEB-int gen	0 (0)	8 (17.8)	8 (17.8)
REDEB-sev gen	9 (20)	15 (33.3)	24 (53.3)
Total	14 (31.1)	31 (68.9)	45 (100)
Gingival lesions	Male patients (%)	Female patients (%)	P-value
Presence	11 (78.6)	17 (54.8)	0.087
Absence	3 (21.4)	14 (45.2)	
Total	14 (100.0)	31 (100.0)	
Dentition	Primary	Mixed	Permanent	P-value
Male patients with lesions (%)	1 (9)	4 (36.4)	6 (54.6)	0.512
Female patients with lesions (%)	0	5 (29.4)	12 (70.6)	

RDEB-int gen = recessive dystrophic epidermolysis bullosa, intermediate generalized; RDEB-sev gen = recessive dystrophic epidermolysis bullosa, severe generalized; DDEB = dominant dystrophic epidermolysis bullosa.

Multivariate logistic regression analysis

Logistic regression analysis showed that, after controlling for various potential confounders, the only significant predictors for the development of gingival lesions were gender (males carry a higher risk; $p = 0.031$) and the type of DEB (recessive forms carry a higher risk; $p = 0.001$), whereas age was not a significant risk factor ($p = 0.826$) (Table 5).

DISCUSSION

We describe the results of a cross-sectional study on 45 patients with DEB. To the best of our knowledge, this is the first study to report on the frequency and severity of gingival lesions in a population affected by DEB.

The study sample mainly comprised patients with RDEB-sev gen (53.3%) and was quite homogenous in terms of age between males and females, but not in terms of gender distribution and prevalence of gingival lesions. Indeed, the number of females significantly exceeded the number of males (31 vs 14) and the total

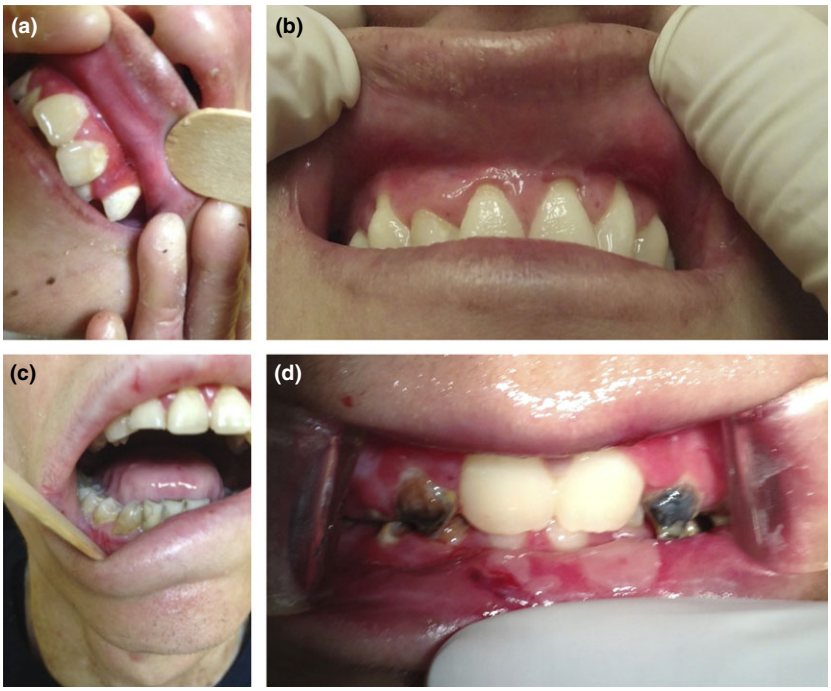

Fig. 1 (a) Diffuse and marked erythema of the upper gingiva in a patient with RDEB-int gen showing accumulation of dental plaque on upper right and left central incisors; (b) localized and mild erythema in a patient with DDEB without any sign of dental plaque; (c) diffuse and marked erythema and erosions of the lower right gingiva in a patient with RDEB-sev gen without any sign of dental plaque; (d) generalized erythematous and erosive lesions involving all upper and lower gingiva in a patient with RDEB-sev gen showing localized plaque accumulation.

number of gingival lesions was higher in females than in males (44 vs 30). However, the probability of presenting with gingival lesions was higher in males than in females (OR: 7.52; p = 0.031) (Table 5). The influence of gender on the course and type of gingival involvement is unknown. Our logistic regression analysis demonstrated that the recessive form represents a higher risk factor for the onset of gingival lesions than the dominant form, mostly in the severe generalized form (OR: 45.29; p = 0.001) (Table 5).

These results are consistent with previous observations[2,3] that confirmed that the RDEB-sev gen form

Table 2. Frequency and distribution of four types of lesions in DEB patients with gingival involvement

	No. of lesions maxilla (%)		No. of lesions mandible (%)		Total no. of lesions (%)	
Type of lesion	Male	Female	Male	Female	Male	Female
Erythema	10 (62.5)	15 (68.18)	9 (64.3)	15 (68.18)	19 (63.3)	30 (68.1)
Erosion/ulcer	5 (31.2)	7 (31.82)	4 (28.6)	7 (31.82)	9 (30)	14 (31.9)
Blister	1 (6.3)	0 (0)	1 (7.1)	0 (0)	2 (6.7)	0 (0)
Atrophy	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
P-value	0.246		0.223		0.091	

Table 3. Disease activity score on gingival mucosa per type of DEB

Gingiva	EB type	Median	IQR	Range (min–max)	K–W ANOVA
Both jaws	*DDEB*	0.0	[0–0]	[0–2]	$p < 0.001$
	RDEB-int gen	0.5	[0–2]	[0–2]	
	RDEB-sev gen	2.0	[2–4]	[0–4]	
Maxilla	*DDEB*	0.0	[0–0]	[0–1]	$p < 0.001$
	RDEB-int gen	0.0	[0–1]	[0–1]	
	RDEB-sev gen	1.0	[1–2]	[0–2]	
Mandible	*DDEB*	0.0	[0–0]	[0–2]	$p < 0.001$
	RDEB-int gen	0.5	[0–1]	[0–1]	
	RDEB-sev gen	1.0	[1–2]	[0–2]	

IQR = interquartile range; RDEB-int gen = recessive dystrophic epidermolysis bullosa, intermediate generalized; RDEB-sev gen = recessive dystrophic epidermolysis bullosa, severe generalized; DDEB = dominant dystrophic epidermolysis bullosa.

Table 4. Correlation between age and disease activity total score calculated in each DEB group

Gingiva	EB type	Spearman ρ correlation	P-value
Both jaws	*DDEB*	0.372	0.210
	RDEB-int gen	0.362	0.221
	RDEB-sev gen	0.132	0.530
Maxilla	*DDEB (total)*	0.537	0.058
	RDEB-int gen	0.437	0.121
	RDEB-sev gen	0.132	0.530
Mandible	*DDEB (total)*	0.101	0.741
	RDEB-int gen	0.159	0.653
	RDEB-sev gen	0.161	0.441

RDEB-int gen = recessive dystrophic epidermolysis bullosa, intermediate generalized; RDEB-sev gen = recessive dystrophic epidermolysis bullosa, severe generalized; DDEB = dominant dystrophic epidermolysis bullosa.

Table 5. Multivariate logistic regression analysis of risk factors associated with the presence of any type of gingival lesion

Independent variables	B	SE	P-value	OR (95%CI)
Age (years)	0.005	0.024	0.826	1.01 (0.66–1.45)
Male vs Female	2.018	1.238	0.031	7.52 (4.56–13.92)
RDEB-int gen vs DDEB	1.883	1.366	0.067	6.57 (2.62–15.22)
RDEB-sev gen vs DDEB	3.813	1.174	0.001	45.29 (30.17–70.73)
Adjusted R^2	0.514		<0.001	

OR = adjusted odds ratio; RDEB-int gen = recessive dystrophic epidermolysis bullosa, intermediate generalized; RDEB-sev gen = recessive dystrophic epidermolysis bullosa, severe generalized; DDEB = dominant dystrophic epidermolysis bullosa.

represents the most disabling and disfiguring EB form in terms of oral-pharyngeal manifestations. This includes the presence of the four active lesions widespread on the entire oral cavity as well as a remarkable scarring phenotype, with subsequent impairment of phonatory and masticatory functions.

Our results showed a greater frequency of erythematous lesions on both jaws equally distributed between the groups of males and females. It seems reasonable to believe that the predominance of such lesions in the study group may indicate an active status of inflammation (high disease activity score), mainly related to the fragility of epithelium that can easily form blisters, erosions/ulcerations, and to a lesser extent, an accumulation of local irritating factors (i.e. dental plaque, aggravation of the symptomatology, gingival inflammation), such as dental plaque, with a subsequent aggravation of the symptomatology and increased levels of gingival inflammation. As gingival lesions are usually persistent and painful, such discomfort could predispose patients to visit their dentists less frequently and not efficiently perform domiciliary oral hygiene practices.

Notably, only 8 DEB patients (28.5%) reported erythematous lesions associated with dental plaque: 2 females and 2 males in the mixed dentition and 2 females and 2 males in the permanent dentition (Table 1). In all 8 patients, gingival lesions were extensive and involved all upper and/or lower mucosa gingiva, while dental plaque was site-specific. Therefore, it is very unlikely that dental plaque could be the primary cause of erythema as it is more likely to be just an aggravating factor.

Therefore, due to a wide variety and quite common presence of oral-pharyngeal lesions, mostly located on gingival mucosa, oral management of DEB patients represents a big challenge. It must include topical medications to reduce inflammation as well as the chance of developing new blisters/erosions, and periodic sessions of professional oral hygiene and daily domiciliary oral hygiene in order to remove local irritating factors that may aggravate gingival lesions.

Several studies[11–13] have already demonstrated the usefulness of topical corticosteroids (i.e. clobetasol or flucinonide 0.05% ointment in adhesive paste), or topical calcineurine inhibitors (i.e. tacrolimus 0.1% in the treatment of lichen planus, mucous membrane pemphigoid and pemphigus vulgaris). These encouraging results might lead clinicians to perform clinical trials for EB patients presenting with gingival lesions. However, this rare disease is inherited and the therapy would be a palliative treatment rather than a cure.

Domiciliary oral hygiene should be practised with a manual toothbrush containing a small head and soft bristle soaked in lukewarm water prior to use, or alternatively, cotton buds (cotton swabs), disposable mini brushes, clean cotton cloth, or gauze, if the patients's mouth is very sore. In addition, the use of alcohol-free chlorhexidine 0.12% and fluoride is strongly recommended as adjuvant therapy.[14] Professional hygiene should also be practised with an ultrasonic scaler, used gently and carefully to reduce the possibility of bulla formation.[14]

In this study, we have focused our attention only on those lesions representing the disease activity of EB rather than any possible scarring phenotype, as the former might be modulated with an appropriate topical therapy[11–13] in association with several preventive measures,[7,15] whereas the latter represents a stable condition that may aggravate over time. Indeed, a scarring phenotype may remarkably alter gingival fornices and lead to their partial or complete obliteration with subsequent impairment of food clearance.[14,16] Vestibule obliteration is an irreversible condition lacking medical treatment, but a promising therapy might come from periodontal plastic surgery to increase the width of attached gingival.[17]

The limitations of this study include the reduced sample size and the lack of inclusion of any Mexican

patients with simplex and junctional EB. A better understanding of the population frequency and severity of gingival lesions could be achieved through further multicentre investigations on larger cohorts representing all types/subtypes of EB. However, this appears an ongoing challenge as EB is a rare condition with significant mortality and morbidity rates in addition to a high risk of participant fatigue. At the time of the study, we did not perform a complete periodontal examination as an additional exam would have been too burdensome for the EB patients. However, we intend to follow-up with this in the near future to better address this aspect.

Our study is unique in demonstrating the prevalence of erythema as a major manifestation of gingival lesions in DEB patients. The high frequency of all these different types of gingival lesions (mainly erythema/erosions) in DEB patients emphasizes the need for further investigations. This will be required to better ascertain whether and how such lesions may influence periodontal status, considering that the accumulation of local irritating factors (i.e. dental plaque) may only partly contribute to this. Nonetheless, we cannot exclude a potential relationship between gingival lesions and the plaque-related periodontal damage, concluding that DEB patients require a higher level of attention.

It is likely that other factors strictly related to pathogenesis of such disorder may play a role in the formation of gingival lesions and subsequent periodontal involvement. For this reason, this study is also aimed at alerting not only oral medicine specialists but general dental practitioners to be highly careful in treating DEB patients.

ACKNOWLEDGEMENTS

We would like to thank patients with EB for their courage, strength and love, all DebRA Mexico staff, especially Lic Erika Salas. We would like to thank Dr Gina DeStefano, Columbia University, for her kind assistance in editing the original manuscript.

REFERENCES

1. Pai S, Marinkovich MP. Epidermolysis bullosa: new and emerging trends. Am J Clin Dermatol 2002;3:371–380.
2. Fine JD, Bruckner-Tuderman L, Eady RA, *et al.* Inherited epidermolysis bullosa: updated recommendations on diagnosis and classification. J Am Acad Dermatol 2014;70:1103–1126.
3. Wright JT. Oral manifestations in the epidermolysis bullosa spectrum. Dermatol Clin 2010;28:159–164.
4. Fortuna G, Chainani-Wu N, Lozada-Nur F, *et al.* Epidermolysis Bullosa Oropharyngeal Severity (EBOS) score: a multicenter development and reliability assessment. J Am Acad Dermatol 2013;68:83–92.
5. Sadler E, Laimer M, Diem A, *et al.* [Dental alterations in junctional epidermolysis bullosa–report of a patient with a mutation in the LAMB3-gene]. J Dtsch Dermatol Ges 2005;3:359–363.
6. Asaka T, Akiyama M, Domon T, *et al.* Type XVII collagen is a key player in tooth enamel formation. Am J Pathol 2009;174:91–100.
7. Wright JT, Fine JD, Johnson LB. Oral soft tissues in hereditary epidermolysis bullosa. Oral Surg Oral Med Oral Pathol 1991;71:440–446.
8. Serrano-Martinez MC, Bagan JV, Silvestre FJ, Viguer MT. Oral lesions in recessive dystrophic epidermolysis bullosa. Oral Dis 2003;9:264–268.
9. Wright JT, Fine JD, Johnson L. Hereditary epidermolysis bullosa: oral manifestations and dental management. Pediatr Dent 1993;15:242–248.
10. Fortuna G, Lozada-Nur F, Pollio A, *et al.* Patterns of oral mucosa lesions in patients with epidermolysis bullosa: comparison and agreement between oral medicine and dermatology. J Oral Pathol Med 2013;42:733–740.
11. Lozada-Nur F, Miranda C, Maliksi R. Double-blind clinical trial of 0.05% clobetasol propionate (corrected from proprionate) ointment in orabase and 0.05% fluocinonide ointment in orabase in the treatment of patients with oral vesiculoerosive diseases. Oral Surg Oral Med Oral Pathol 1994;77:598–604.
12. Lozada-Nur F, Huang MZ, Zhou GA. Open preliminary clinical trial of clobetasol propionate ointment in adhesive paste for treatment of chronic oral vesiculoerosive diseases. Oral Surg Oral Med Oral Pathol 1991;71:283–287.
13. Corrocher G, Di Lorenzo G, Mansueto P, *et al.* Comparison of topical tacrolimus 0.1% in pectin ointment with clobetasol 0.5% ointment in adults with moderate to severe desquamative gingivitis: a 4-week, randomized, double-blind clinical trial. Clin Ther 2006;28:1296–1302.
14. Kramer SM, Serrano MC, Zillmann G, *et al.* Oral health care for patients with epidermolysis bullosa – best clinical practice guidelines. Int J Paediatr Dent 2012;22 Suppl 1:1–35.
15. Feijoo JF, Bugallo J, Limeres J, Penarrocha D, Penarrocha M, Diz P. Inherited epidermolysis bullosa: an update and suggested dental care considerations. J Am Dent Assoc 2011;142:1017–1025.
16. Wright JT. Comprehensive dental care and general anesthetic management of hereditary epidermolysis bullosa. A review of fourteen cases. Oral Surg Oral Med Oral Pathol 1990;70:573–578.
17. Buduneli E, Ilgenli T, Buduneli N, Ozdemir F. Acellular dermal matrix allograft used to gain attached gingiva in a case of epidermolysis bullosa. J Clin Periodontol 2003;30:1011–1015.

Address for correspondence:
Dr Giulio Fortuna
Chief Resident
Department of Oral Medicine
Carolinas Medical Center
1000 Blythe Boulevarde
Charlotte NC 28203
USA
Email: giulio.fortuna@carolinashealthcare.org